5-15-2019

NOT ALL TASKS ARE ALIKE: EXPLORING THE EFFECT OF TASK REPRESENTATION ON USER ENGAGEMENT IN CROWD-BASED IDEA EVALUATION

Carina Benz
Karlsruhe Institute of Technology, carina.benz@kit.edu

Naim Zierau
University of St. Gallen, naim.zierau@unisg.ch

Gerhard Satzger
KIT, gerhard.satzger@kit.edu

NOT ALL TASKS ARE ALIKE: EXPLORING THE EFFECT OF TASK REPRESENTATION ON USER ENGAGEMENT IN CROWD-BASED IDEA EVALUATION

Research paper

Benz, Carina, Karlsruhe Institute of Technology, Karlsruhe, Germany, carina.benz@kit.edu

Zierau, Naim, University of St. Gallen, St. Gallen, Switzerland, naim.zierau@unisg.ch

Satzger, Gerhard, Karlsruhe Institute of Technology, Karlsruhe, Germany, gerhard.satzger@kit.edu

Abstract

Crowdsourcing has experienced increasing popularity in recent years. While performance-based issues, such as the quantity or quality of output produced by the crowd, have been in the focus of research, users' experience, which unfolds through interaction with the crowdsourcing platform and ultimately creates engagement, has been largely neglected. However, user engagement does not only determine the scope of effort users put into the crowdsourcing task, but is considered a determinant for future participation. This paper focusses on the role of task representation–manifested in mechanisms for crowd-based idea evaluation–as potential stimuli for user engagement. Therefore, we conduct a web-based experiment with 198 participants to investigate how different task representations translate into differences in users' experience and their engagement. In particular, we analyze two distinctive task representations: sequential judgement tasks in form of multi-criteria rating scales and simultaneous choice tasks in the form of enterprise crowdfunding. We find differences in task representation to influence user engagement while mediated by a user's perceived cognitive load. Moreover, our findings indicate that user engagement is determined by a user's perceived meaningfulness of a task. These results enhance our understanding of user engagement in crowdsourcing and contribute to theory building in this emerging field.

Keywords: Crowdsourcing, Task Representation, Engagement, Cognitive Load, Task Meaningfulness.

1 Introduction

Following successful cases like Dell's Ideastorm–which attracted 8,801 idea submissions by 4285 contributions in only two years–an increasing number of organizations have started to implement crowdsourcing initiatives as a mean to extend their internal knowledge and strengthen their workforce (Bayus, 2013; Di Gangi et al., 2004). The foundational principle is rather simple: A crowd is asked to participate in an IT-mediated activity in which an entity (the crowdsourcer) proposes a task to users to create mutual value (Blohm et al., 2011). Despite the popularity of crowdsourcing initiatives, not all crowdsourcers manage to engage a sufficient number of participants over the time: Dahlander and Piezunka (2013) show that 90 percent of crowdsourcing initiatives receive less than 30 responses per year. Moreover, even those projects that have succeeded in attracting a large enough crowd, suffer from strikingly unequal participation rates. While only one percent of their crowdsourcing community shows high engagement, the vast majority of 90 percent remains mostly passive (Dahlander and Piezunka, 2013). However, in the past, the primary focus of practitioners and researchers alike, has been on the achievement of quantity and quality-related goals of crowdsourcing implementations (Kern et al., 2012; Ye and Kankanhalli, 2013). Research aiming to understand antecedents and levers of emotional or behavioral effects on crowdsourcing users has evolved only recently (Deng and Joshi, 2016; Troll et al., 2016). However, the feeling of engagement among users is the key foundation for

sustainable behavioral encouragement and future participation (Ajzen and Fishbein, 1975). User engagement, described as a situational or lasting connection between a user and a technological resource, is rooted in user experience beyond pure functionality (O'Brien and Toms, 2010). Consequently, the engagement of users in crowdsourcing translates into "the quality of effort […] users devote to open collaboration activities that contribute directly and indirectly to desired outcomes" (de Vreede et al., 2013).

Prior research indicates that task representation can be understood as a determinant of user engagement: Riedl et al. (2013) show that the design of a task to be solved by the crowd is determining a user's attitudes towards the crowdsourcing platform. Furthermore, there is evidence for differences in activity levels, frustration, and user's satisfaction levels that are driven by differences in task representations (Blohm et al., 2011; Wagenknecht et al., 2017a). Despite these indications for the importance of task representation for successful IT-based crowdsourcing (Lipusch et al., 2017), there is still very little understanding of how differences in task representation affect user engagement.

To address this question, we draw upon the specific crowdsourcing use case of crowd-based idea evaluation. Crowd-based idea evaluation refers to the selection, filtering, or (relative) quality assessment of idea proposals based on the opinion of a large group of users, which is often facilitated by IT-platforms. It needs to highly rely on user engagement for continuous participations, since participants in general act voluntarily and do not receive any monetary incentives (Corney et al., 2009). Moreover, we can currently observe various task representations–in the form of idea evaluation mechanisms–running concurrently (Merz, 2018). Two idea evaluation mechanisms considerably varying in terms of task representation are traditional multi-attribute rating scales (Riedl et al., 2010) and the more recent enterprise crowdfunding mechanism (Feldmann and Gimpel, 2016; Lipusch et al., 2017). The first ("rating") is representing a sequential judgement task, whereas the latter ("funding") is designed as simultaneous choice task in which idea proposal evaluation is realized by participants fiduciarily investing corporate funds in promising ideas (Simons et al., 2019). Choosing idea evaluation tasks as research object not only organically provides different representations of one task, but assures practical relevance and transferability since we can rely on actual implementations of idea evaluation mechanisms. Consequently, this study aims to address the following research question:

RQ: *How does the representation of the idea evaluation task in crowd-based idea evaluation affect the engagement of the users?*

Targeting this question, we follow a quantitative research approach by designing and conducting a web-based experiment including a subsequent questionnaire. The experiment employs a between-subject design with random assignment of 198 participant to two different representations of tasks–rating and funding–in the context of crowd-based idea evaluation. In doing so, this study contributes to both, theory and practice. From a theoretical perspective, our study contributes to the body of knowledge in crowdsourcing as well as human-centered platform design by empirically examining the effect of different task representations on users' perception of the task, as well as their engagement. From a practical perspective, our study will provide guidance on the design and framing of crowdsourced idea evaluation tasks to organizations and platform operators.

The remainder of this paper is structured as follows: the second chapter provides conceptual background and evaluates related work on the topic of crowdsourcing, engagement and task representation. Chapter three introduces the research model and our hypotheses. Chapter four elaborates on our approach for empirical investigation, including a detailed description of the experimental set-up and the measurement of key variables. Chapter five presents our empirical results. Chapter six summarizes the findings of this study and evaluates them with regard to future research.

2 Theoretical Foundations

2.1 Crowdsourcing and Crowd-based Idea Evaluation

Crowdsourcing aims at tapping into the collective effort and wisdom of a crowd for organizational innovation or problem solving (de Vreede et al., 2013). In an open call to a group of potential contributors, a crowdsourcer (e.g., a company) seeks for the solution of task (Blohm et al., 2011). The ensu-

ing interaction process between a crowdsourcer and the crowd of users is facilitated by an IT-based crowdsourcing platform (Blohm et al., 2011). In the case of crowd-based idea evaluation, the crowd–most commonly comprised of employees or customers–is tasked with the systematic evaluation of ideas for novel services and products (Blohm et al. 2011). Following Corney et al. (2009), crowd-based idea evaluation is characterized as a voluntary evaluation task that can be performed by most people since it does not rely on unique ability or specific skills. This crowd-based approach to idea evaluation promises to address two issues faced by organizations. First, traditionally applied expert-based approaches are hitting capacity and time constraints due to an increasing number of ideas to be evaluated (Di Gangi and Wasko, 2009), (e.g., caused by open innovation initiatives (Chesbrough, 2003)). Moreover, speed is becoming an additional, decisive factor in the innovation process, increasing the demand for scalable and real-time idea evaluation to ensure commercial success and survival. Second, expert-based selection processes can neither leverage the know-how of the broader organization nor that of actors outside of the company such as customers or partners (von Hippel, 2005).
Independent of the type of task, the creation of mutually beneficial value is contingent to crowdsourcing initiatives (Estellés-Arolas and González-Ladrón-De-Guevara, 2012; Lusch et al., 2016; Troll et al., 2018). In most cases, the primary value for crowdsourcers is the efficient solution of organizational problems, e.g., sourcing ideas for new products (Blohm et al., 2016). However, reported benefits in addition to the pure provision of solutions to a problem, are numerous. These include brand visibility, formation of stakeholder relationships, or community building (Muller et al., 2013; Ye and Kankanhalli, 2015). Likewise, the motivation for user participation is multi-facetted and does not only account for economic rationales (e.g. receiving financial rewards), but rather includes benefits such as social recognition, skill development, or entertainment (Brabham, 2010; Estellés-Arolas and González-Ladrón-De-Guevara, 2012; Kaufmann et al., 2011).

2.2 User Engagement on Crowdsourcing Platforms

In the current decade, engagement has been put forth as a major concept to distinguish attitudes and behaviors that go beyond apparent value contributions, such as purchasing or problem-solving. Thereby, literature has taken different perspectives on this phenomenon: In the context of crowdsourcing, depending on the role of the subject to be engaged (i.e., customer, employee, or technology user), and the resulting target behavior (i.e., consume, work, use), customer engagement (Brodie et al., 2011), employee engagement (Macey and Schneider, 2008) or user engagement (O'Brien and Toms, 2013) seem to be applicable. However, the underlying understanding of engagement as a dynamic experiential process by which a specific type of psychological state results in behavioral value contributions (Troll et al., 2016) is superimposable. For the purpose of this study, i.e. to analyze the impact of task representation manifested in the design of a crowdsourcing platform for idea evaluation, we focus on the user perspective. User engagement consists of the users' ongoing activities, attitudes, and intrinsic interest and is often described as a state of high levels of energy, involvement, and efficacy (Kim et al., 2013). Particularly tailored to the crowdsourcing case, de Vreede et al. (2013) define user engagement contingent to behavioral output as "the quality of effort online users devote to open collaboration activities that contribute directly and indirectly to desired outcomes". This quality of effort can be assessed through a user's degree of participation (i.e., the number of interactions such as commenting, voting, etc.), the time spent on the platform, and user's self-perceptions of engagement (de Vreede et al., 2013).
Research aiming for a conceptualization of engagement conceives user engagement as a multi-dimensional construct (Attfield et al., 2011; O'Brien and Toms, 2010). O'Brien and Toms (2013) model engagement as construct composed of six dimensions (perceived usability, aesthetics, focused attention, felt involvement, novelty, and endurability). Attfield et al. (2011) broadly conceptualize user engagement as a situational or enduring cognitive, emotional, and behavioral connection between a user and a technological resource–that is the crowdsourcing platform (Attfield et al., 2011). Both approaches emphasize the holistic nature of user engagement that can be manifested in a single session or a more long-term relationship across multiple interactions (Attfield et al., 2011). In addition, Troll et al. (2018) formulate engagement as process model: perceived interaction points, so-called stimuli, and prior experiences serve as input to stimulate a subject's cognitive, emotional and behavioral experience dimension, which initiates an experience evaluation process. The sum of all intermediate expe-

rience evaluations results in a final commitment state and related behavioral consequences (Troll et al., 2018). Despite the presence of studies aiming to understand and conceptualize user engagement in crowdsourcing (de Vreede et al., 2013; Nguyen et al., 2015; Troll et al., 2018, 2017), empirical investigations providing generalizable interferences do not exist yet.

2.3 Task Representation in Crowd-based Idea Evaluation

Task representation refers to the design of a task in terms of complexity, difficulty, structure, ambiguity and novelty (Chan and Song, 2008). Differences in task representation require distinctive levels of involvement (time and effort), cognitive resources or opportunity costs (Zhao and Zhu, 2014) and evoke differences in perception and motivation (Nov et al., 2011). Task representation in crowd-based idea evaluation is primarily determined by the choice of idea evaluation mechanisms (Blohm et al., 2016; Lipusch et al., 2017): Using *voting* mechanisms, users need to pronounce encouragement for ideas by assigning votes (Blair and Mumford, 2007). In *enterprise crowdfunding*, users fiduciarily invest funds in a set of competing ideas (Schwienbacher and Larralde, 2010). *Rating scales* as mechanism tasks them with assessing numerical values to each idea separately (Riedl et al., 2013), while in *preference markets*, idea stocks can be traded similarly to stocks in stock markets (Lauto and Valentin, 2013). The *bag of lemons* approach asks users to only eliminate ideas of low quality (Klein and Garcia, 2015). Two evaluation mechanisms that highly differ in terms of task representation are the traditionally applied rating scale mechanism and the recently emerging enterprise crowdfunding mechanism.

Rating scales enable users to evaluate a finite set of alternatives by applying a number of pre-defined criteria. In the context of idea evaluation, often well-known innovation dimensions, such as novelty, feasibility, relevance, and specificity (Dean et al., 2006), are used as these criteria. By assigning numerical values to these criteria, rating scales aim to identify the 'best' alternative in relation to the specified criteria (Limayem and DeSanctis, 2000). Using aggregating and weighting algorithms, these individual ratings can be summarized to group decisions.

Under the term enterprise crowdfunding or internal crowdfunding, the crowdfunding mechanism known from classical online implementations has successfully been spreading as a tool for idea assessment and decision support within organizations (Feldmann et al., 2014; Muller et al., 2013). In this context, employees are endowed with corporate funds, which they can freely invest in projects initiated by their colleagues (Muller et al., 2013). Enterprise crowdfunding fundamentally differs from classical crowdfunding: While online crowdfunding is primarily used to seek financing for startups and small businesses, enterprise crowdfunding is applied by established companies to foster innovation, collaboration and effective evaluation of ideas (Simons et al., 2019).

In terms of task representation, both mechanisms differ: Rating scales represent idea evaluation as a judgement task (Riedl et al., 2010), while enterprise crowdfunding depicts a choice task (Lipusch et al., 2017). Judgement involves assessing one idea at a time, while choice implies selecting preferable ideas by comparing a set of alternatives to each other (Blohm et al., 2016). Therefore, rating scales bring about an absolute assessment, which is determined against the scale and has a meaningful interpretation on its own. In contrast, in applying enterprise crowdfunding the user creates a relative comparison of all ideas, whereby the idea perceived to be the best is used as the benchmark (Agrawal et al., 2015). Thus, knowledge of all ideas must be established for a meaningful interpretation. Second, both mechanisms vary regarding the evaluation means. Rating scales let users assign numerical values to an idea, which represents a slightly abstract evaluation outcome, while in the context of enterprise crowdfunding users allocate real money to projects, underlining the seriousness of their decision (Barnett, 2001).

3 Theory Development and Hypotheses

Although, task representation is crucial for the success of IT-supported crowd-based idea evaluation, it is still poorly understood at this time (Blohm et al., 2016; Lipusch et al., 2017). The same applies to the understanding of experience and underlying mechanisms of the engagement process in crowdsourcing (Troll et al., 2017). Drawing on cognitive and affective theory, we consequently investigate how differences in the representation of a crowdsourcing task act as stimuli affecting users' en-

gagement. For this purpose, we draw on two different idea evaluation mechanism for crowd-based idea evaluation–rating scales and enterprise crowdfunding–which highly differ in terms of task representation.

According to the body of knowledge, engagement is (amongst others) impacted by intellectual challenge and affective involvement (O'Brien and Toms, 2010). Equally, task representation is found to be a trigger for affective and cognitive reactions to the task (Campbell, 1988). Hence, to enhance the understanding of underlying mechanisms of the engagement process, we aim to understand the effect of task representation on user engagement via two different paths: the cognitive and the affective path.

From a cognitive perspective, cognitive load theory depicts idea evaluation as a cognitive problem-solving process, which is impacted by task representation (Sweller, 1988). Cognitive load refers to "the load that performing a particular task imposes on [an individual's] cognitive system" (Sweller et al., 1998, p. 266). Consequently, next to the individual's cognitive system capacity, the task's representation determines the cognitive load posed on an individual. Research shows that high levels of cognitive load can shake the users' confidence to solve a task adequately, resulting in a negative feeling towards the whole experience (Riedl et al., 2010).

From an affective perspective, research in the context of crowdsourcing indicates the potential of task meaningfulness for affective involvement. Task meaningfulness is defined as the extent to which a task "(a) is recognized and/or (b) has some point or purpose" (Ariely et al., 2008, p. 672). In a field experiment, in which participants were asked to label medical images, those that were told that they were labelling tumor cells to assist medical research were more likely to participate and performed better than participants who were not given any rationale (Chandler and Kapelner, 2013). Another study shows that task meaningfulness increases the involvement of users and helps them to develop a more favorable attitude towards their contributions (Moussawi and Koufaris, 2013). Although, previous literature investigated the influence of task meaningfulness on performance differences, the influence on user engagement has so far been neglected (Görzen, 2017).

3.1 Cognitive Path: Perceived Cognitive Load

Cognitive load is a theory rooting in research on education and learning psychology. Cognitive load theory assumes that the capacity of humans' working memory is restricted (Sweller, 1988). Hence, when performing a certain task, task solvers are confronted with mental effort, which is the load imposed by the task, and need to put mental effort in form of cognitive capacity and resources to accommodate the task's demands (Sweller et al., 1998). High levels of cognitive load are provoked in situations in which individuals are confronted with high information volumes that need to be processed (this refers to information overload (Schultz and Vandenbosch, 1998)), or in which they experience time or cost constraints (Milkman et al., 2008). Idea evaluation is a rather challenging task, since there are a number of development paths to each idea, which are characterized by a high degree of uncertainty. While some traits of the evaluation task, such as the set of ideas to be evaluated, cannot be altered to simplify decision-making, task representation as a major antecedent of cognitive load, can actively be designed (e.g. in the form of idea evaluation mechanisms) (Blohm et al., 2016). Consequently, ill-designed mechanisms may add to the cognitive load experienced by the user (Paas et al., 2010), notably by affecting intrinsic cognitive load.

Intrinsic cognitive load refers to the complexity of a task (Sweller et al., 1998). While usage of rating scales is intuitive, idea evaluation via enterprise crowdfunding may represent a more complex task (Winkelmann et al., 2008). These differences are grounded in the interrelation of information items that need to be processed in the working memory. Consequently, differences in cognitive load will be greater with the number of idea proposals to be evaluated. When using a rating scale, idea evaluation is associated with low levels of item interconnectedness. The user assesses the quality of each idea in a sequential fashion by matching given evaluation criteria to a subjective assessment and transforming those to a numerical scale (Limayem and DeSanctis, 2000). Moreover, complexity is reduced due to the decomposition of the evaluation task into less complex subtasks employing different evaluation criteria (Benz et al., 2018; Dean et al., 2006). In contrast, funding, representing a choice task, exhibits higher levels of item interactivity. The mechanism requires users to select appropriate candidates from a set of ideas by creating an interrelated problem space (Lipusch et al., 2017). Furthermore, users must integrate all aspects of idea quality into one assessment (Riedl et al., 2010). Finally, investment deci-

sions are interrelated, as choices are dependent on the user's wallet (Burtch, 2011). In sum, applying enterprise crowdfunding as mechanism for idea evaluation may force users to simultaneously judge the quality of interrelated items, thus prompting higher cognitive load compared to using a rating scale.

Research indicates that user engagement is directly linked to the perceived alignment of the a given task's complexity and the individual's belief to successfully solve this task (Moussawi and Koufaris, 2013). If individuals perceive a decision-making task to be too complex, the emotional consequence usually is frustration due to the inability to connect all necessary information in order to make an informed decision (Kamis et al., 2008). This may invoke a feeling of inadequacy, shaking the confidence of an individual. If the cognitive load imposed by the evaluation task exceeds the user's cognitive capacity, he may encounter a negative experience straining their overall engagement (Riedl et al., 2010). As perceived cognitive load reflects the cognitive effort associated with the idea evaluation task, it should be negatively associated with user engagement. High levels of perceived cognitive load can be observed in situations, in which a user feels to be not able to provide the cognitive capacity to solve a given task. This feeling of not satisfying the requirement will translate into lower levels of engagement. Similarly, low perception of cognitive load reflects a state in which the cognitive load imposed by a task seems manageable to the users. Thus, perceived cognitive load should act as a mediator in the relationship between the task and user engagement. We hypothesize that:

H1a: *Task representation influences perceived cognitive load, such that perceived cognitive load will be higher for users of enterprise crowdfunding than for users of rating scales.*

H1b: *Perceived cognitive load mediates the effect of task representation on user engagement, such that higher perceived cognitive load leads to less engagement.*

3.2 Affective Path: Perceived Task Meaningfulness

Task meaningfulness refers to the inclination of individuals to search for a sense of purpose in a task. It can be defined as the value of fulfilling a task based on one's principles, expectations, and values (Thomas and Velthouse, 1990). In the context of this study, perceived task meaningfulness can be understood as value generated by the crowdsourcing task itself (Moussawi and Koufaris, 2013). Organizational psychology distinguishes between extrinsic and intrinsic work value orientation. While extrinsic orientations are focused on realization and protection of economic rationales, intrinsic orientations are leaning towards higher order needs–i.e., developing one's capabilities, achieving personal goals, and making meaningful contributions to individuals and society (Vansteenkiste et al., 2007). Task meaningfulness, therefore, relates to intrinsic work value orientations.

Studies show that task representation can positively impact perceived task meaningfulness by contributing to intrinsic work value orientations (Kaufmann et al., 2011). Task representation manifested in the mechanisms for crowd-based idea evaluation may, therefore, impact perceived task meaningfulness. While usage of rating scales yields a fairly abstract result, participation in enterprise crowdfunding does not only result in idea evaluation, but also entails funding assignment to a project (Burtch et al., 2015). Therefore, users may experience a greater sense of responsibility and seriousness in relation to their evaluation task. Moreover, users are endowed with real money, which highlights the trust of an organization into the individual and, thus, signifies the role of their work. In contrast, using rating scales, organizations ultimately rely on an expert authority for the assignment of funds to projects. In addition, the sequential nature of the judgement task can be experienced as a monotonous task causing boredom and lowering feelings of appreciation (Chandler and Kapelner, 2013).

Research suggests that tasks that are intrinsically enjoyable are more likely to evoke engagement (Kim et al., 2013). If individuals perceive a (decision-making) task to be meaningless, the affective consequence usually is indifference to the proposed options (Thomas and Velthouse, 1990). Consequently, if the meaning induced by the evaluation task may not be in line with the users' sense of purpose, they may encounter a negative experience straining their overall engagement with the task. On the other hand, individuals are expected to be most engaged when they experience a high level of intrinsic motivation for the given tasks (Amabile et al., 1990). When perceiving high task meaningfulness, we assume intrinsic motivation to be high, since the users understand what their effort is good for and which

role their effort plays. Thus, perceived task meaning should act as a mediator between task representation and user engagement. We consequently hypothesize that:

H2a: *Task representation influences perceived task meaningfulness, such that perceived task meaningfulness will be higher for users of enterprise crowdfunding than for users of rating scales.*

H2b: *Perceived task meaningfulness mediates the effect of the task representation on user engagement, such that higher perceived task meaningfulness leads to higher user engagement.*

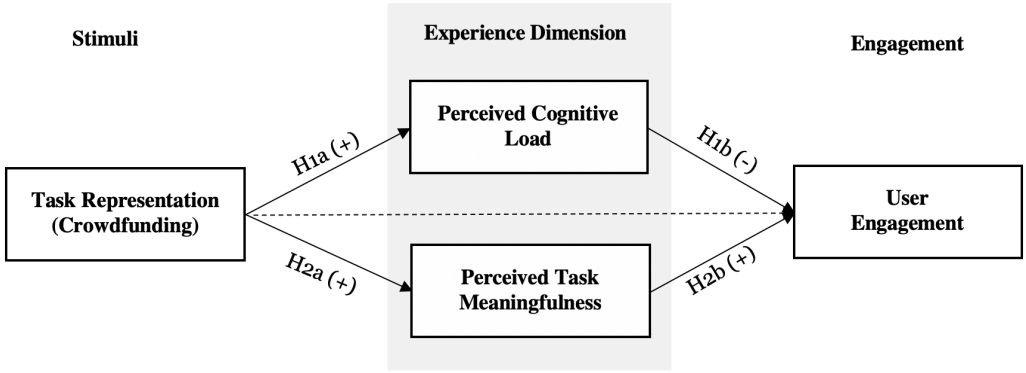

Figure 1. Research Model

4 Empirical Investigation

The research model is tested in a web-based between-subject experiment. Details on sampling, procedure, treatments, and measurement of variables are explained below.

4.1 Sample

Our participant sample consists of 198 individuals to participate in an online experiment. In total, we observe 388 website calls, whereof 199 participants finished the experimental procedure. One data point is excluded due to non-response in the questionnaire. Participants are recruited via advertising on the research institute's social media channels. 39.90% of the 198 participants are female, average age was 25.71 years, and 72.00% of participants hold an academic degree (Bachelor, Master, or PhD). 52.0% of the participants stated that they have strong interest in the electric mobility domain, 42.5% have medium interest and 1.5% have no domain interest. For our idea sample, we refer to a pool of 29 ideas submitted to a national innovation contest. The contest asked for submissions of ideas for services in the context of electric mobility. This domain restriction allows us to obtain a more homogenous sample of ideas and to partially control for personal preferences. For the experiment, idea descriptions are anonymized and standardized to only contain textual descriptions to prevent biases related to the exposure of images. Based on an initial evaluation of a focus group of four professionals in the area of electric mobility and/or innovation management, we aggregated the idea sample to a stratified sample of 12 ideas with equal occurrence of ideas of high, medium and low quality. Hence, workload of participants can be kept to a tolerable level.

4.2 Procedure and Treatment

The research model is tested in an online experiment employing a one-factorial between-subject design. To ensure internal validity, participants are randomly assigned to the two treatment conditions of the independent variable *task representation* (rating (RA) vs. funding (FU)). This results in cell sizes of 90 for the enterprise crowdfunding and 108 for the rating idea evaluation mechanism. Prior to the start of the experiment, a clear explanation of the experiment scenario and the task at hand is given to the participants. To make sure that the participants fully understand the instructions, they have to complete a small questionnaire. Following the task description and explanations on how to use the

idea evaluation platform, participants are confronted with the individual ideas, which they can inspect on an overview page and in detail, when selecting each particular idea. In each treatment condition, participants are faced with 12 randomly ordered ideas, which they are tasked to evaluate regarding their quality from a business perspective. As for the idea evaluation mechanisms, we differentiate between rating scales and enterprise crowdfunding. We use a multi-attribute rating scale which consists of three attributes reflecting critical dimensions of idea quality: Novelty, relevance, and feasibility (Dean et al., 2006). Elaboration, commonly also used as an assessment attribute in innovation management, was not considered since our experiment featured early stage idea descriptions with a low level of detail. However, we add a criterion that allows users to indicate their overall impression of an idea. We choose to implement a multi-attribute rating scale since previous literature has shown that these kinds of scales perform well concerning rating satisfaction and decision quality (Blohm et al., 2016; Riedl et al., 2013). The enterprise crowdfunding exercise is designed to resemble real-world scenarios like, for example, interorganizational crowdfunding at IBM (Muller et al., 2013). Enterprise crowdfunding as idea evaluation mechanism entails major differences from the original conceptions of online crowdfunding (Simons et al., 2019). First, users are not working with their own money, but are given a fixed amount of money (or equivalent) which they can freely invest into the proposals. In our experiment, each participant is endowed with $1,000 only to be used within the context of the platform. We decide against using a virtual currency like "Thalers" to make users feel more accommodated to the scenario and the seriousness of their decision. The participants are free to contribute any sum of money to any number of ideas within the range of their budget. Second, a distinct feature of crowdfunding within enterprises is that it is usually conducted as an all-or-nothing setting, since in a company setting projects without proper financial backing cannot be realized (Cooper, 2009). To that end, users were told that only fully funded projects would be implemented. However, to exclude effects attributed to overfunding, the experimental design ensured that the threshold could not be reached, even if all users invested all of their money in one idea. Finally, to eliminate effects related to the requested size of project funding, we decide to use equal thresholds for all ideas. For both idea evaluation mechanisms, participants are free to evaluate an arbitrary number of ideas, which resembles most real-world settings and consequently ensures external validity. Conditions for seeing previous evaluator's assessments also were the same between treatment groups. After completing the experimental idea evaluation part, participants are directed to a subsequent questionnaire capturing their perception of the task (perceived task meaningfulness, perceived cognitive load, user engagement) and demographics.

4.3 Measurement of Variables

Data on user engagement, perceived cognitive load and perceived task meaningfulness is collected with a post-experimental online questionnaire. For the measurement of perceived cognitive load, we combine three items of the scale developed by Schultz and Vandenbosch (1998) with the total set of four items of the scale proposed by Blohm et al. (2016)–with the former focusing on cognitive overload evoked by information overload and the latter on cognitive load evoked by task complexity. Perceived task meaningfulness was captured using a scale developed by Chandler and Kapelner (2013). To measure user engagement, we adapt the scale of O'Brien and Toms (2013) to a set of 16 items excluding questions concerning the aesthetics of the platform. All items are measured on a 5-point Likert scale. The survey was pre-tested with eight participants that were asked to provide feedback on the understandability of the questions. Minor changes were made based on this feedback.

5 Results

Prior to testing the hypotheses, we tested validity and reliability of our measures. Cronbach's Alphas of at least 0.7 suggest good reliability of factors. Three of the initial 16 items measuring user engagement where excluded due to low item-to-total correlations (ITTC) (0.01-0.15). Items are equally weighted aggregated to the corresponding constructs: user engagement (UE), perceived cognitive load (PCL), and perceived task meaningfulness (PTM) (see Appendix A). We carried out a multivariate analysis of variance to verify random assignment of users to treatments and found no systematic dif-

ferences in gender ($FEMALE_{RA}$=45.4% $FEMALE_{FU}$=33.3%, F=2.02, p>0.1), age (M_{RA}=25.99 years, M_{FU}=25.37 years, F=1.04, p>0.1) and education (F=1.35, p>0.1) between the treatments.

	Total sample (n=198)			Rating users (n= 108)			Funding users (n=90)		
	Mean	**SD**	**Min/Max**	**Mean**	**SD**	**Min/Max**	**Mean**	**SD**	**Min/Max**
UE	3.68	0.63	1.23/5.00	3.69	0.65	1.23/5.00	3.66	0.60	2.00/5.00
PCL	2.01	0.64	1.00/4.17	1.92	0.60	1.00/4.00	2.12	0.67	1.00/4.17
PTM	3.74	0.75	1.00/5.00	3.74	0.72	1.00/5.00	3.74	0.79	1.25/5.00
Time (min)	14:27	05:51	1:06/32:43	15:36	05:34	01:06/32:43	13:04	05:54	02:44/27:45

Table 1. Descriptive Statistics

Before testing the hypotheses, we present basic descriptive statistics. Table 1 depicts means, standard deviations, as well as minimum and maximum values. Applying two-sided t-tests, it is revealed that users in the funding treatment take less time for their evaluation (p<0.01) and exhibit higher perceived cognitive load (p<0.05). Differences as to user engagement and perceived task meaningfulness, however, are not significant.

Model	**Estimate**	**Std. Err.**	**t-value**	**p-value**	**R^2**
DV: Perceived Cognitive Load					0.03
Intercept	1.91	0.06	31.41	0.00***	
Task Representation	0.21	0.09	2.29	0.02**	
DV: Perceived Task Meaningfulness					<0.01
Intercept	3.74	0.07	51.56	0.00***	
Task Representation	0.00	0.11	0.013	0.99	
DV: User Engagement					0.00
Intercept	3.69	0.06	60.96	0.00***	
Task Representation	-0.02	0.09	-0.33	0.743	
Note: *p < 0.10; **p < 0.05; ***p < 0.01					

Table 2. Regression Results with Idea Evaluation Mechanism as Independent Variable

To test H1a and H2a, we performed OLS regressions with perceived cognitive load, perceived task meaningfulness and user engagement as dependent variables (DV). Task representation as nominal variable was dummy-coded (RA=0; FU=1). Results indicate that the representation of the idea evaluation task significantly predicts users' perceived cognitive load (b=0.21, p<0.05). This relationship holds true when controlling for the time users spend on the idea evaluation platform. Nevertheless, our data does not show a significant effect of the representation of the idea evaluation task on either perceived task meaningfulness (p>0.1) or user engagement (p>0.1). Consequently, H2a can at the moment not be supported.

Furthermore, we hypothesized that perceived cognitive load (H1b) and perceived task meaningfulness (H2b) mediate the effect of task representation on user engagement, such that higher levels of perceived cognitive load and perceived task meaningfulness lead to higher user engagement. The proposed relationship is examined by carrying out a mediation analysis using the bootstrap test (5,000 resamples) by Preacher and Hayes (2004). This procedure for analyzing mediation effects is superior to the Sobel test or Baron and Kenny's (1986) approach (Zhao et al., 2010). In support of H1b, the overall indirect path from task representation to user engagement through perceived cognitive load was significant (b=-0.04, se=0.02) with a 95% confidence interval (Conf. Int.) excluding zero [-0.09, -0.01][1]. The overall indirect path from task representation to user engagement through perceived task meaningfulness, however, was not significant with a 95% confidence interval including zero [-0.11, 0.11]. Holding perceived cognitive load and perceived task meaningfulness constant, the direct path

[1] According to literature, an indirect effect is considered significant if the confidence interval does not include zero (Preacher and Hayes, 2004)

between idea evaluation mechanism and engagement was not significant (b = -0.01, t = 0.18, p > 0.10) providing evidence for an indirect-only ("full") mediation (Zhao et al., 2010).

Part 1: Regression Analysis						
Model	**Estimate**	**Std. Err.**	**t-value**	**p-value**	**95% Conf. Int.**	**R^2**
DV: User Engagement						0.52
Intercept	2.09	0.21	9.73	0.00***	[1.66;2.51]	
Perceived Cognitive Load	-0.20	0.05	-3.95	0.00***	[-0.11;0.14]	
Perceived Task Meaningfulness	0.53	0.04	12.37	0.00***	[-0.30;-0.10]	
Task Representation	0.01	0.06	0.19	0.85	[0.45;0.62]	
Part 2: Analysis of Direct and Indirect Effects						
	Estimate	**BootSE**	**t-value**	**p-value**	**95% Conf. Int.**	
Direct Effect of TR on UE	0.01	0.06	0.18	0.85	[-0.11;0.14]	
Indirect Effects						
Total	-0.04	0.06	n.a.	n.a.	[-0.17;0.09]	
Perceived Cognitive Load	-0.04	0.02			[-0.09;-0.01]	
Perceived Task Meaningfulness	0.00	0.06			[-0.11;0,11]	
Note: *p < 0.10; **p < 0.05; ***p < 0.01						

Table 3. Results of the Bootstrapping Mediation Analysis (Preacher and Hayes, 2004)

Summarizing, our findings show a mediated effect of a task's representation on users' engagement in the context of crowd-based idea evaluation. Although our data does not indicate a direct link between task representation and user engagement, our results indicate that enterprise crowdfunding as task representation is experienced as being mentally more taxing, which is manifested in a significant difference in participants' cognitive load as well as in a significant path between task representation and perceived cognitive load. Our mediation analysis, furthermore, shows that this experience translates into participants feeling less engaged. As for the affective path from task representation to user engagement, we are not able to support our proposed hypothesis based on the data observed: We neither observe a significant difference in perceived task meaningfulness between different task representations nor does task meaningfulness mediate the relationship between task representation and user engagement. However, perceived task meaningfulness is found to be a significant determinant for user engagement. These findings might to some degree be affected by the nature of our research design being a web-experiment. After all, it was perspicuous to participants that the ideas will not be implemented and as such the effect of 'giving money' may not have translated into higher engagement. Second, these results may indicate that users are less impacted by the means (points vs. money) through which a decision is made, but rather by the fact of being incorporated into the decision process. Most organizations do not involve the crowd into these kinds of decisions (Muller et al. 2013) and as such the act of being asked to co-decide on strategic manners such as future innovation projects may represent the primary source of appraisal or motivation.

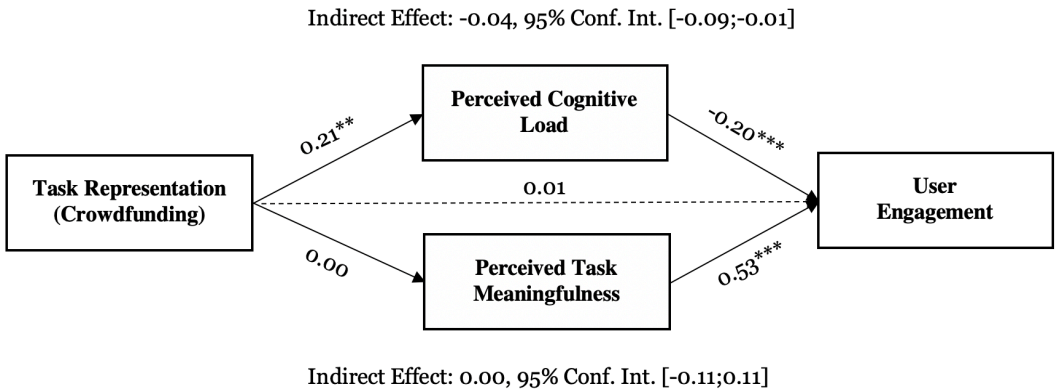

Figure 2. Summary of the Results of the Bootstrapping Mediation Analysis

6 Conclusion

Our study aimed at providing a comprehensive understanding on how the representation of a task assigned to crowdsourcing users affects their engagement. Drawing on knowledge in the field of applied psychology and information systems (IS), we theorize that differences in task representation translate into differences in user's experience–namely perceived cognitive load and perceived task meaningfulness–which in turn translates into different levels of user engagement. The proposed research model is tested following a quantitative research approach by designing and conducting a web-based experiment including a subsequent questionnaire. The experiment employs a between-subject design with random assignment of 198 participant to two different representations of tasks–rating and funding–in the context of crowd-based idea evaluation. We observe a significant effect of task representation on perceived cognitive load, which serves as mediator between task representation and user engagement. Although our data does not reveal perceived task meaningfulness to be influenced by task representation, we observe perceived task meaningfulness to significantly affect user engagement.

6.1 Theoretical Contribution

Extending previous research in the field of crowdsourcing, IS, and open innovation, we are pioneering by performing quantitative analyses of user engagement and associated experience-based determinants in the scope of crowd-based idea evaluation. Consequently, we contribute to the body of knowledge in multiple ways: First, we provide empirically grounded insights into task representation as a determinant for user engagement. In this regard, we demonstrate how differences in task representation translate into differences in user's experience and ultimately in their engagement. In doing so, we confirm interrelations between experience-based aspects and user engagement, as proposed by existing process models for engagement in crowdsourcing (Troll et al., 2018). Second, we contribute to the general understanding of how crowds are best engaged in a crowdsourcing task (Estellés-Arolas and González-Ladrón-De-Guevara, 2012). We can show that both, reducing cognitive load by choosing appropriate task representation and increasing task meaningfulness, can foster value creation for the user as well as the organization. Contributing to research on collective decision-making, our findings show that task representation, manifested in less cognitively straining decision processes, may not only support rigorous decision-making (Blohm et al. 2016), but may also drive positive user experience and user engagement. Moreover, by comparing two popular idea evaluation mechanism that are increasingly leveraged to make crowd-based decisions on potential innovation projects (e.g., Muller et al. 2013), we additionally expand the existing open innovation literature: While enterprise crowdfunding is a promising approach to stimulate engagement within organizations, our findings identify potential limits to engagement based on the cognitive effort that is associated with the simultaneous choice task of distributing funds to idea proposals. Moreover, our findings suggest that from the perspective of perceived meaningfulness, it makes no difference to users whether they assign points or allocate money to idea proposals.

6.2 Practical Contribution

Our research indicates that user engagement in IT-mediated collective decision-making can be improved by reducing cognitive load and by increasing task meaning. Thereby, we can make the following recommendation regarding the design of mechanisms for crowd-based judgements of idea quality: First, presenting idea evaluation as a judgement task instead of a choice task can reduce perceived cognitive load and thereby generate higher levels of user engagement. Notably, using multi-attribute rating scales helps to reduce the complexity of the challenging task of identifying valuable ideas by decomposing it into manageable sub-tasks. Designing easy-to-perform tasks supports users in efficiently allocating their cognitive resources and, thus, provides them with a high sense of control. Therefore, organizations should acknowledge the importance of conducting rigorous usability testing in the development of participatory IS. These design choices are particularly important when the task itself imposes a high cognitive load on the user. Second, the interaction process with the platform should be characterized by high task meaning. Even though our research suggests that task representation does not significantly influence task meaning, previous studies show that stimuli grounded in so-

cial cues (such as peer interaction) can provide additional meaning to users (Troll et al., 2018; Wagenknecht et al., 2017b). In any case, our study results suggest implementing such stimuli to enhance the perceived meaningfulness of a task and, indirectly, the user engagement.

6.3 Limitations and Outlook

While our study provides findings to both, research and practice, we acknowledge some limitations that should be considered. However, these limitations may at the same time provide exciting opportunities for future research. First, our study focused on idea evaluation as a particular crowdsourcing task, and the experimental analysis of two different representations of this task. This scenario was chosen for reasons of practical relevance, however, broadening the scope of analysis to different crowdsourcing tasks, as well as on the investigation of differences in tasks itself will contribute to demonstrate generalizability of our findings. Second, some general shortcomings result from conducting a controlled experiment, which necessarily abstracts from the real world by making specific design choices that can limit the degree to which those findings can be generalized. Particularly, the different platform designs were implemented in their most basic fashion to ensure interpretability of collected data. For instance, we did not consider various functionalities that enable social interaction or different forms of media content aimed at involving the user. In practice, most crowdsourcing platforms tend to be highly interactive to foster collaboration between the users and to create an exciting experience (Blohm et al. 2016). While these design choices constitute deliberate confinements to real-world settings, we found it more important to focus on the affective and cognitive processes explaining perceptual differences of decision-making in the context of crowd-based idea evaluation. In addition, it can be assumed that task meaningfulness in a hypothetical experimental scenario might differ from the perception of a task's meaningfulness in reality. It was evident to the participants that the ideas were not implemented after all. Future research could build on our study by explicitly transferring our experiment to a real-world based setting to investigate the interaction between these decision processes and various other potential influencing factors. This may also help in overcoming our third limitation, which is coined by the fact that the experimental setting only allows us to report on perceived engagement of crowdsourcing users in the short term. Long-term effects of user engagement and related behavioral changes, as acknowledged by Troll et al. (2018) or de Vreede et al. (2013), should be assessed in future field studies. Fourth, the measures we employed to capture differences in cognitive and affective states were based on questionnaires. Future research might turn to methods from the field of Neuro-IS (Wagenknecht, Teubner, et al. 2017), which potentially offer more objective measures.

Appendix A: Measurement of Constructs

Construct	Alpha	ITTC	Mean	SD
User Engagement[a]	0.86		3.68	0.36
I felt annoyed with evaluating the ideas		0.53		
I felt engaged while evaluating the ideas		0.53		
I found the evaluation of ideas confusing		0.39		
The time I spent evaluating ideas just slipped away		0.46		
I felt interested in my idea evaluation task		0.66		
The content on the idea evaluation platform incited my curiosity		0.49		
My idea evaluation experience was fun		0.64		
I was so involved in my idea evaluation task that I lost track of time		0.47		
I felt involved in the evaluation task		0.41		
My idea evaluation experience was rewarding		0.68		
I was really drawn into my idea evaluation task		0.69		
I consider my idea evaluation experience a success		0.47		
I blocked out things around me when I was using the idea evaluation platform		0.51		

Perceived Cognitive Load[b]	0.77		2.01	0.64
Using the evaluation platform lead to information overload		0.40		
While using the evaluation platform I perceived a lot of unsolicited information		0.55		
While using the evaluation platform it was hard to focus on what needed to be done		0.53		
To what extent did you come across problems about which you were unsure while evaluating ideas?		0.56		
To what extent do you feel that it is difficult to evaluate the ideas?		0.44		
To what extent do you feel that your evaluations were vague and difficult to anticipate?		0.64		
Perceived Task Meaningfulness[c]	0.78		3.74	0.75
I liked that the task seemed useful and had a good purpose		0.58		
I felt good completing the task		0.48		
The task seemed a lot more useful than the other evaluation task I did before		0.63		
The task was well-designed and respected my efforts and work more than typical evaluation tasks		0.59		
It was worthwhile evaluating ideas on the evaluation platform.		0.52		

[a]Adopted from O'Brien and Toms (2013); 1 = "strongly disagree", 5 = "strongly agree".
[b]Adopted from Schultz and Vandenbosch (1998) (item 1-3) and Blohm et al. (2016) (item 4-7); 1 = "strongly disagree", 5 = "strongly agree".
[c]Adopted from Chandler and Kapelner (2013); 1 = "strongly disagree", 5 = "strongly agree".

References

Agrawal, A., Catalini, C., Goldfarb, A., 2015. Crowdfunding: Geography, Social Networks, and the Timing of Investment Decisions. J. Econ. Manag. Strateg. 24, 253–274.

Amabile, T.M., Goldfarb, P., Brackfield, S.C., 1990. Social Influences on Creativity: Evaluation, Coaction, and Surveillance. Creat. Res. J. 3, 6–21.

Ariely, D., Kamenica, E., Prelec, D., 2008. Man's search for meaning: The case of Legos. J. Econ. Behav. Organ. 67, 671–677.

Attfield, S., Kazai, G., Lalmas, M., Piwowarski, B., 2011. Towards a science of user engagement (Position Paper). In: WSDM Workshop on User Modelling for Web Applications.

Barnett, T., 2001. Dimensions of moral intensity and ethical decision making: An empirical study. J. Appl. Soc. Psychol. 31, 1038–1057.

Baron, R.M., Kenny, D.A., 1986. The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. J. Pers. Soc. Psychol. 51, 1173–1182.

Bayus, B.L., 2013. Crowdsourcing New Product Ideas over Time: An Analysis of the Dell IdeaStorm Community. Manage. Sci. 59, 226–244.

Benz, C., Zierau, N., Satzger, G., 2018. To Rate or to Fund? - The Effect of Idea Evaluation Platform Design on Decision Quality and User Engagement. In: Proceedings of the 39th International Conference on Information System (ICIS), San Francisco, CA, USA.

Blair, C.S., Mumford, M.D., 2007. Errors in idea evaluation: Preference for the unoriginal? J. Creat. Behav. 41, 197–222.

Blohm, I., Riedl, C., Füller, J., Leimeister, J.M., 2016. Rate or trade? Identifying winning ideas in open idea sourcing. Inf. Syst. Res. 27, 27–48.

Blohm, I., Riedl, C., Leimeister, J.M., Krcmar, H., 2011. Idea Evaluation Mechanisms for Collective Intelligence in Open Innovation Communities: Do Traders Outperform Raters? In: Proceedings of the 32nd International Conference on Information Systems (ICIS), Shanghai, China.

Brabham, D.C., 2010. Moving the Crowd at Threadless. ISSN: 13, 1122–1145.

Brodie, R.J., Hollebeek, L.D., Jurić, B., Ilić, A., 2011. Customer engagement: Conceptual domain, fundamental propositions, and implications for research. J. Serv. Res. 14, 252–271.

Burtch, G., 2011. Herding behavior as a network exernality. In: Proceedings of the 32nd International Conference on Information Systems (ICIS). Shanghai, China.

Burtch, G., Ghose, A., Wattal, S., 2015. The Hidden Cost of Accommodating Crowdfunder Privacy Preferences: A Randomized Field Experiment. Manage. Sci. 61, 949–962.

Campbell, D.J., 1988. Task Complexity: A Review and Analysis. Acad. Manag. Rev. 13, 40–52.

Chan, S.H., Song, Q., 2008. Motivational Framework: Insights into Decision Support System Use and Decision Performance. Decis. Support Syst. 84, 32–35.

Chandler, D., Kapelner, A., 2013. Breaking monotony with meaning: Motivation in crowdsourcing markets. J. Econ. Behav. Organ. 90, 123–133.

Chesbrough, H., 2003. Open innovation: the new imperative for creating and profiting from technology, XXXI. ed. Harvard Business School Press, Boston, Mass.

Cooper, R.G., 2009. How Companies are Reinventing Their Idea-to-Launch Methodologies. Res. Manag. 52, 47–57.

Corney, J.R., Torres-Sánchez, C., Jagadeesan, P.P., Lynn, A., Regli, W.C., 2009. Outsourcing labour to the cloud, International Journal of Innovation and Sustainable Development.

Dahlander, L., Piezunka, H., 2013. Open to suggestion: a longitudinal study of attempts to build user ideation communities. Acad. Manag. Proc. 2013, 15204–15204.

de Vreede, T., Nguyen, C., de Vreede, G.-J., Boughzala, I., Oh, O., Reiter-Palmon, R., 2013. A Theoretical Model of User Engagement in Crowdsourcing. In: Proceedings of the 19th International Conference on Collaboration and Technology (CRIWG). Wellington, New Zealand, pp. 94–109.

Dean, D.L., Hender, J.M., Rodgers, T.L., Santanen, E.L., 2006. Identifying Good Ideas : Constructs and Scales for Idea Evaluation. J. Assoc. Inf. Syst. 7, 646–699.

Deng, Y., Joshi, K.D., 2016. Why individuals participate in micro-task crowdsourcing work environment: Revealing crowdworkers' perceptions. J. Assoc. Inf. Syst. 17, 648–673.

Di Gangi, P.M., Wasko, M., 2009. Steal my idea! Organizational adoption of user innovations from a user innovation community: A case study of Dell IdeaStorm. Decis. Support Syst. 48, 303–312.

Di Gangi, P.M., Wasko, M.M., Hooker, R.E., 2004. Getting Customers' Ideas to Work for You: Learning from Dell how to Succeed with Online User Innovation Communities. MIS Q. Exec. 9, 213–228.

Estellés-Arolas, E., González-Ladrón-De-Guevara, F., 2012. Towards an integrated crowdsourcing definition. J. Inf. Sci. 38, 189–200.

Feldmann, N., Gimpel, H., 2016. Financing Projects through Enterprise Crowdfunding: Understanding the Impact of Proposal Characteristics on Funding Success. In: Proceedings of the 24th Conference on Information Systems (ECIS). Istanbul, Turkey.

Feldmann, N., Gimpel, H., Muller, M., Geyer, W., 2014. Idea Assessment via Enterprise Crowdfunding: An empirical analysis of decision-making styles. In: Proceedings of the 22nd European Conference on Information Systems (ECIS). Tel Aviv, Israel.

Görzen, T., 2017. " What is it Good for – Absolutely Nothing ? " Exploring the Influence of Task Meaning on Creativity in Crowdsourcing. In: Proceedings of the 38th International Conference on Information Systems (ICIS), Seoul 2017.

Kamis, A., Koufaris, M., Tziporah, S., 2008. Using an Attribute-Based Decision Support System for User-Customized Products Online: An Experimental Investigation. MIS Q. 32, 159–177.

Kaufmann, N., Schulze, T., Veit, D., 2011. More than fun and money. Worker Motivation in Crowdsourcing – A Study on Mechanical Turk. In: Proceedings of the 17th Americas Conference on Information Systems (AMCIS), Detroit 2011.

Kern, R., Thies, H., Zirpins, C., Satzger, G., 2012. Dynamic and Goal-Based Quality Management for Human-Based Electronic Services. Int. J. Coop. Inf. Syst. 21, 3–29.

Kim, Y.H., Kim, D.J., Wachter, K., 2013. A study of mobile user engagement (MoEN): Engagement motivations, perceived value, satisfaction, and continued engagement intention. Decis. Support Syst. 56, 361–370.

Klein, M., Garcia, A.C.B., 2015. High-speed idea filtering with the bag of lemons. Decis. Support Syst. 78, 39–50.

Lauto, G., Valentin, F., 2013. How preference markets assist new product idea screening. Ind. Manag. Data Syst. 116, 603–619.

Limayem, M., DeSanctis, G., 2000. Providing Decisional Guidance for Multicriteria Decision Making in Groups. Inf. Syst. Res. 11, 386–401.

Lipusch, N., Dellermann, D., Philipp, E., 2017. Using Crowdfunding for Start-Up Evaluation: How Task Representation Influences Prediction of the Crowd. In: Proceedings of the 25th European Conference on Information Systems (ECIS), Guimarães, Portugal, pp. 3036–3048.

Lusch, R.F., Vargo, S.L., Gustafsson, A., 2016. Fostering a trans-disciplinary perspectives of service ecosystems. J. Bus. Res. 69, 2957–2963.

Macey, W.H., Schneider, B., 2008. The Meaning of Employee Engagement. Ind. Organ. Psychol. 1, 3–30.

Merz, A.B., 2018. Mechanisms to Select Ideas in Crowdsourced Innovation Contests – A Systematic Literature Review and Research Agenda. In: Proceedings of the 26th European Conference on Information Systems (ECIS). Portsmouth, UK.

Milkman, K.L., Chugh, D., Bazerman, M., 2008. How can decision making be improved? Working Paper, Harvard Business School.

Moussawi, S., Koufaris, M., 2013. The Crowd on the Assembly Line: Designing Tasks for a Better Crowdsourcing Experience. In: Proceeding of the 34th International Conference on Information Systems (ICIS). Milan, Italy.

Muller, M., Geyer, W., Soule, T., Daniels, S., Cheng, L.-T., 2013. Crowdfunding inside the Enterprise: Employee-Initiatives for Innovation Collaboration. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems - CHI ’13. Paris, France.

Nguyen, C., Tahmasbi, N., Vreede, T. De, Vreede, G. De, Oh, O., Reiter-Palmon, R., 2015. Participant Engagement in Community Crowdsourcing. In: Proceedings of the 23th European Conference on Information Systems (ECIS). Münster, Germany.

Nov, O., Arazy, O., Anderson, D., 2011. Technology-Mediated Citizen Science Participation : A Motivational Model. In: Proceedings of the 5th International AAAI Conference on Weblogs and Social Media. Barcelona, Spain.

O’Brien, H.L., Toms, E.G., 2010. The Development and Evaluation of a Survey to Measure User Engagement. J. Am. Soc. Inf. Sci. Technol. 61, 50–69.

O’Brien, H.L., Toms, E.G., 2013. Examining the generalizability of the User Engagement Scale (UES) in exploratory search. Inf. Process. Manag. 49, 1092–1107.

Paas, F., Renkl, A., Sweller, J., 2010. Cognitive Load Theory and Instructional Design: Recent Developments. Educ. Psychol. 38, 1–4.

Preacher, K.J., Hayes, A.F., 2004. SPSS and SAS procedures for estimating indirect effects in simple mediation models. Behav. Res. Methods, Instruments, Comput. 36, 717–731.

Riedl, C., Blohm, I., Leimeister, J.M., Krcmar, H., 2010. Rating scales for collective intelligence in innovation communities: Why quick and easy decision making does not get it right. In: Proceedings of the 31st International Conference on Information Systems (ICIS). St. Louis, MO, USA.

Riedl, C., Blohm, I., Leimeister, J.M., Krcmar, H., 2013. The Effect of Rating Scales on Decision Quality and User Attitudes in Online Innovation Communities. Int. J. Electron. Commer. 17, 7–36.

Schultz, U., Vandenbosch, B., 1998. Information Overload in a Groupware Environment: Now You See It, Now You Don't. J. Organ. Comput. Electron. Commer. 8, 127–148.

Schwienbacher, A., Larralde, B., 2010. Crowdfunding of Small Entrepreneurial Ventures, SRRN Electronic Journal.

Simons, A., Lena, •, Kaiser, F., Vom Brocke, J., 2019. Enterprise Crowdfunding: Foundations, Applications, and Research Findings. Bus. Inf. Syst. Eng. 61, 113–121.

Sweller, J., 1988. Cognitive Load During Problem Solving: Effects on Learning, Cognitive Science. 5, 257-285.

Sweller, J., Van Merrienboer, J.J.G., Paas, F., 1998. Cognitive Architecture and Instructional Design. Educ. Psychol. Rev. 10, 251–296.

Thomas, K.W., Velthouse, B.A., 1990. Cognitive Elements of Empowerment: An "Interpretive" Model of Intrinsic Task Motivation. Acad. Manag. Rev. 15, 666–681.

Troll, J., Blohm, I., Leimeister, J.M., 2016. Revealing the Impact of the Crowdsourcing Experience on the Engagement Process. In: Proceedings of the 37th International Conference on Information Systems (ICIS), Dublin, Ireland.

Troll, J., Blohm, I., Leimeister, J.M., 2018. Why Incorporating a Platform-Intermediary Can Improve the Crowdsourcee's Engagement Process. Bus. Inf. Syst. Eng. Vol. Onlin.

Troll, J., Naef, S., Blohm, I., 2017. A Mixed Method Approach to Understanding Crowdsourcees' Engagement Behavior. In: Proceedings of the 38th International Conference on Information Systems (ICIS). Seoul, South-Korea.

Vansteenkiste, M., Neyrinck, B., Niemiec, C.P., Soenens, B., De Witte, H., Van Den Broeck, A., 2007. On the relations among work value orientations, psychological need satisfaction and job outcomes: A self-determination theory approach. J. Occup. Organ. Psychol. 80, 251–277.

von Hippel, E., 2005. Democratizing Innovation. The MIT Press, Cambridge, Massachusetts.

Wagenknecht, T., Crommelinck, J., Teubner, T., Weinhardt, C., 2017a. When Life Gives You Lemons: How rating scales affect user activity and frustration in collaborative evaluation processes. In: Proceedings der 13. Internationalen Tagung Wirtschaftsinformatik (WI). pp. 380–394.

Wagenknecht, T., Teubner, T., Weinhardt, C., 2017b. Peer Ratings and Assessment Quality in Crowd-Based Innovation Processes. In: Proceedings of the 25th European Conference on Information Systems (ECIS). Guimarães, Portugal.

Winkelmann, A., Herwig, S., Poeppelbuss, J., Tiebe, D., Becker, J., 2008. Discussion of functional design options for online rating systems: A state-of-the-art analysis. In: Proceedings of the 18th European Conference on Information Systems (ECIS). Galway, Ireland.

Ye, H., Kankanhalli, A., 2013. Leveraging Crowdsourcing for Organizational Value Co-Creation. Commun. Assoc. Inf. Syst. 33, 225–244.

Ye, H.J., Kankanhalli, A., 2015. Investigating the antecedents of organizational task crowdsourcing. Inf. Manag. 52, 98–110.

Zhao, X., Lynch, J.G., Chen, Q., 2010. Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis. J. Consum. Res. 37, 197–206.

Zhao, Y., Zhu, Q., 2014. Evaluation on crowdsourcing research: Current status and future direction. Inf. Syst. Front. 16, 417–434.